

**TMDL FOR TURBIDITY FOR VINTON
WATERWAY (SUBSEGMENT 110601) IN
THE SABINE RIVER BASIN, LOUISIANA**

**FINAL
MARCH 26, 2007**

TMDL FOR TURBIDITY FOR VINTON WATERWAY
(SUBSEGMENT 110601) IN THE SABINE RIVER BASIN, LOUISIANA

Prepared for

US EPA Region 6
Water Quality Protection Division
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EXECUTIVE SUMMARY

Section 303(d) of the Federal Clean Water Act requires states to identify waterbodies that are not meeting water quality standards, and to develop total maximum daily loads (TMDLs) for those waterbodies. A TMDL is the amount of pollutant that a waterbody can assimilate without exceeding the established water quality standard for that pollutant. Through a TMDL, pollutant loads can be allocated to point sources and nonpoint sources discharging to the waterbody. This report presents a TMDL that has been developed for turbidity for Vinton Waterway (subsegment 110601) located in the Sabine River basin in southwestern Louisiana.

The Vinton Waterway (subsegment 110601) is a navigation and drainage canal connecting the city of Vinton, Louisiana to the Gulf Intracoastal Waterway. This subsegment covers 110 mi², and the two largest land uses are wetlands (34%) and pasture/hay (31%).

The Vinton Waterway was included on the Louisiana Department of Environmental Quality (LDEQ) final 2004 303(d) list as not supporting its fish and wildlife propagation designated use. This waterbody was ranked as priority #1 for TMDL development. Stream bank modification/destabilization is identified as a suspected source of impairment in the 303(d) list.

LDEQ historical water quality data at the monitoring station located in the subsegment were analyzed for long term trends, seasonal patterns, and relationships between turbidity and TSS. Neither historical trends nor seasonal patterns were apparent in these data.

Because turbidity cannot be expressed as a mass load, this turbidity TMDL was expressed using TSS as a surrogate. A regression between TSS and turbidity was developed, and a target TSS concentration for the subsegment was calculated using the regression equation and numeric criteria for turbidity in the Louisiana water quality standards.

This TMDL was developed using an average annual mass budget that was based on a long term water balance calculated for this region by the Louisiana Office of State Climatology. Average annual flow for the subsegment was calculated using the average annual runoff from the water balances, and the TMDL was calculated as the average annual flow multiplied by the target TSS concentration. For this TMDL, an implicit margin of safety (MOS) was incorporated through the use of conservative assumptions. The primary conservative assumption was to treat

TSS as a conservative parameter that does not settle out of the water column. In addition to the MOS, 10% of the TMDL was set aside for future growth (FG). Because point sources were considered to have negligible effect on existing violations of water quality standards, all of the load reductions were assigned to nonpoint sources. A nonpoint source percent reduction of 65% was needed for this TMDL. The TMDL is summarized in Table ES.1.

Table ES.1. Turbidity TMDL for subsegment 110601.

Subsegment Number	Stream Name	Loads (tons/day of TSS)					Percent Reduction Needed
		WLA	LA	MOS	FG	TMDL	
110601	Vinton Waterway	0	32.35	implicit	3.60	35.95	65%

Hurricanes Katrina and Rita brought heavy winds and rain to southern Louisiana during August and September 2005. Both Hurricanes Katrina and Rita have caused a significant amount of change in sedimentation and water quality in south Louisiana. Many wastewater treatment facilities were temporarily or permanently damaged. Some wastewater treatment facilities will rebuild while others will relocate. The hurricanes expedited the loss of coastal land and modified the hydrology of some of the coastal waterbodies. Several federal and state agencies including the Environmental Protection Agency (EPA) and LDEQ are engaged in collecting environmental data and assessing the recovery of the Gulf of Mexico waters. This TMDL was developed based on the pre-hurricane conditions. Therefore, the post-hurricane conditions and other factors may require modifications to this TMDL prior to its implementation. Any deviation from this TMDL should be justified based on site-specific data and/or information.

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1.0 INTRODUCTION

This report presents the total maximum daily load (TMDL) for turbidity for Vinton Waterway (subsegment 110601) in the Sabine River basin in southwest Louisiana. This subsegment was included on the Louisiana Department of Environmental Quality (LDEQ) final 2004 303(d) list (LDEQ 2005a) as not supporting its designated use of fish and wildlife propagation. The sources of contamination and causes of impairment from the LDEQ 303(d) list are shown in Table 1.1. The TMDL in this report was developed in accordance with Section 303(d) of the Federal Clean Water Act and the Environmental Protection Agency's (EPA) regulations in 40 CFR 130.7.

The purpose of a TMDL is to determine the pollutant loading that a waterbody can assimilate without exceeding the water quality standards for that pollutant, and to establish the load reduction that is necessary to meet the standards in that waterbody. The TMDL is the sum of the wasteload allocation (WLA), load allocation (LA), future growth (FG), and margin of safety (MOS). The WLA is the load allocated to point sources of the pollutant of concern. The LA is the load allocated to nonpoint sources, including natural background. The MOS is a percentage of the TMDL that takes into account any lack of knowledge concerning the relationship between pollutant loadings and water quality. The FG is the portion of the TMDL that allows for future increases in loads to the waterbody.

Table 1.1. Parameters for impairment addressed in this report.

Subsegment Number	Subsegment Name	Source of Information ¹	Impaired Use ²	Suspected Causes of Impairment							Suspected Sources of Impairment	TMDL Priority (1 = highest)
				Chloride	Sulfate	TDS	Sedimentation/ Siltation	TSS	Turbidity	Fecal Coliforms		
110601	Vinton Waterway	LDEQ 303(d)	FWP						X		Stream bank modification / destabilization	1

Notes:

1. Source of information is the final 2004 LDEQ 303(d) list
2. FWP=Fish and Wildlife Propagation

2.0 BACKGROUND INFORMATION

2.1 General Information

The study area for this project consists of subsegment 110601, representing Vinton Waterway, in the Sabine River basin in southwestern Louisiana (Figure A.1 in Appendix A). The Vinton Waterway is a canal connecting the city of Vinton, Louisiana to the Intracoastal Waterway. The Vinton Waterway subsegment is located in Calcasieu Parish and covers an area of 110 mi². The subsegment is bounded on the west by the Sabine River and on the south by the Gulf Intracoastal Waterway.

2.2 Topography

Subsegment 110601 is located in the Gulf Coastal Plains ecoregion. This subsegment drains to the south, with elevations of about 25 ft above sea level in the northern end of the subsegment and elevations less than 5 ft above sea level in the southern part of the subsegment. The land is relatively flat in this subsegment.

2.3 Soils

Soil textures for subsegment 110601 (Table 2.1) were compiled from the STATSGO database, which is maintained by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). Soils in the study area are primarily silt loams.

Table 2.1. Soil textures for subsegment 110601.

Soil Texture	Percentage of Subsegment
Clay	6%
Loam	23%
Muck	10%
Silt loam	50%
Other textures	11%
Total	100%

2.4 Land Use

Land use characteristics for the study area were compiled from the United States Geological Survey (USGS) 2001 National Land Cover Database (USGS 2006). These data are the most recent land use data that are currently available for this area. The spatial distribution of these land uses is shown on Figure A.2 (located in Appendix A) and land use percentages are shown in Table 2.2. The two largest land uses in this subsegment are wetlands (34.4%) and pasture/hay (31.5%).

Table 2.2. Land use summary for subsegment 110601.

Land Use	Percent Coverage
Water	3.4%
Developed	7.8%
Barren	0.0%
Forest	8.5%
Grass/Shrub	1.8%
Pasture/Hay	31.5%
Cultivated Crops	12.6%
Wetlands	34.4%
Total	100.0%

2.5 Description of Hydrology

Average precipitation for the study area is about 55 inches per year (www.nationalatlas.gov). Average monthly precipitation values for Vinton, Louisiana are shown on Figure 2.1; these values are highest during summer and lowest during spring.

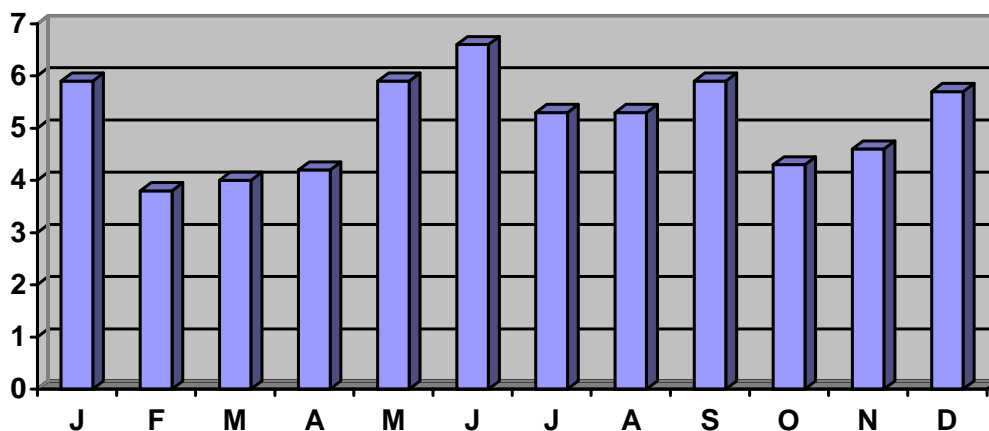


Figure 2.1. Average monthly precipitation (inches) at Vinton, Louisiana (from <http://www.city-data.com/city/Vinton-Louisiana.html>).

There is no USGS flow gaging station located on the Vinton Waterway. The Vinton Waterway is tidally influenced due to its low elevation and its connection to the Gulf Intracoastal Waterway.

2.6 Water Quality Standards

Water quality standards for Louisiana are included in the Title 33 Environmental Regulatory Code (LDEQ 2005b). Designated uses for the Vinton Waterway are primary and secondary contact recreation, and fish and wildlife propagation. The Vinton Waterway is also classified as estuarine. The Title 33 Environmental Regulatory Code includes a numeric criterion of 50 NTU for turbidity in estuarine canals (LDEQ 2005b). Therefore, the value of 50 NTU was used as the turbidity criterion for subsegment 110601 (Vinton Waterway).

2.7 Nonpoint Sources

Streambank modification/destabilization is listed as the suspected source of impairment for this subsegment in the Louisiana 303(d) List (Table 1.1). Streambank erosion could be occurring due to waves from boat traffic and from wind. It is possible that runoff from the watershed may contribute to the turbidity impairment in Vinton Waterway.

2.8 Point Sources

A list of point source discharges in the study area was generated by LDEQ using their TEMPO and PTS databases. Based on this list, there are 18 point source discharges located in subsegment 110601. Information for the discharges in the study area was obtained by FTN Associates, Ltd. (FTN) from LDEQ's Electronic Document Management System (EDMS), and is listed in Appendix B. Only one of the discharges has a permit limit for TSS.

2.9 Previous Water Quality Studies

There are no known previous water quality studies for subsegment 110601.

3.0 EXISTING WATER QUALITY FOR TURBIDITY AND TSS

3.1 General Description of Data

Turbidity and TSS data have been collected by LDEQ at water quality monitoring station 1168 located on the Vinton Waterway in subsegment 110601. The location of the sampling site is shown on Figure A.1 (located in Appendix A). Table 3.1 shows a summary of the data, including percentages of turbidity values above the turbidity criterion. TSS data are included in this summary because TSS is needed as a surrogate parameter for expressing the turbidity TMDL. Time series plots of data for the entire period at the station are shown on Figure C.1 for turbidity and Figure C.2 for TSS (located in Appendix C). These data were obtained from LDEQ.

Table 3.1. Summary of available turbidity and TSS data from station 1168.

Description	Turbidity (NTU)	TSS (mg/L)
Period of Record	1/8/02 – 12/10/02	1/8/02 – 12/10/02
No. of Values	12	12
Minimum	6.5	9.0
Maximum	150.0	114.0
Median	29.0	32.5
No. of Values > 50 NTU	4	NA
% of Values > 50 NTU	33%	NA

3.2 Seasonal Patterns

The highest measured values of both turbidity and TSS occurred in January (Figures C.1 and C.2 in Appendix C), but there are not enough data to confirm a seasonal pattern.

3.3 Relationships Between TSS and Turbidity

A plot of TSS versus turbidity for this station (Figure C.3 in Appendix C) shows a noticeable correlation, with higher turbidity values tending to correspond with higher TSS concentrations. Linear regression was performed on turbidity and TSS and yielded the following relationship: $\text{Turbidity} = 0.9643 * \text{TSS}^{1.072}$.

The strength of the linear regression relationship is measured by the coefficient of determination (R^2) calculated during the regression analysis (Zar 1996). The R^2 value is the fraction of the total variation in turbidity that is explained or accounted for by the fitted regression (TSS). For station 1168, the R^2 value for the turbidity to TSS regression is 0.79, which means 79% of the variation in turbidity is accounted for by TSS, and the remaining 21% of variation in turbidity is unexplained. The unexplained portion is attributed to factors other than TSS.

The statistical significance for the regression was evaluated by computing the “P value” for the slope for the regression. The P value is essentially the probability that the slope of the regression line is really zero. Thus, a low P value indicates that a non-zero slope calculated from the regression analysis is statistically significant. For this regression, the P value was 9.62×10^{-5} , which is considered statistically significant.

4.0 TMDL DEVELOPMENT

4.1 Seasonality and Critical Conditions

EPA's regulations at 40 CFR 130.7 require the determination of TMDLs to take into account critical conditions for stream flow, loading, and water quality parameters. Also, both Section 303(d) of the Clean Water Act and regulations at 40 CFR 130.7 require TMDLs to consider seasonal variations for meeting water quality standard. Therefore, the historical data and analyses discussed in Section 3.0 were used to evaluate whether there were certain periods of the year that could be used to characterize critical conditions. No seasonal patterns were confirmed for turbidity or TSS. Based on these analyses, the TMDL was not developed on a seasonal basis.

4.2 Water Quality Targets

Turbidity is an expression of the optical properties in a water sample that cause light to be scattered or absorbed and is caused by suspended matter, such as clay, silt, and finely divided organic and inorganic matter; soluble colored organic compounds; and plankton and other microscopic organisms (Standard Methods 1999). Turbidity cannot be expressed as a load as preferred for TMDLs. To achieve a load-based value, turbidity is often correlated with a surrogate parameter, such as TSS, that can be expressed as a load. For the turbidity TMDL for subsegment 110601, the relationship between turbidity and TSS presented in Section 3.3 was used to develop a target TSS concentration (i.e., numeric endpoint for the TMDL). The target TSS concentration calculated from the turbidity criterion of 50 NTU was 40 mg/L.

4.3 Methodology for TMDL Calculations

The TMDL in this report was developed using a water balance. In this method, runoff estimates from a water balance calculated by the Louisiana Office of State Climatology for climate region LA07 (southwestern Louisiana) were averaged for the period from 1980 to present to provide an estimate of runoff in subsegment 110601. These runoff data and the average used in this TMDL are shown in Table D.1. This average runoff was multiplied by the area of the Vinton Waterway subsegment (110601) to estimate an annual average flow for the

subsegment. The allowable load for the subsegment (the TMDL) was calculated by multiplying the average annual flow by the TSS target concentration.

4.4 MOS and FG

Both Section 303(d) of the Clean Water Act and regulations at 40 CFR 130.7 require TMDLs to include a MOS to account for uncertainty in available data or in the actual effect that controls will have on the loading reductions and receiving water quality. The MOS may be expressed explicitly as unallocated assimilative capacity or implicitly through conservative assumptions used in establishing the TMDL. For this turbidity TMDL, an implicit MOS was incorporated through the use of conservative assumptions. The primary conservative assumption was calculating the TMDL assuming that TSS is a conservative parameter and does not settle out of the water column. In addition to the implicit MOS, an explicit FG was set equal to 10% of the TMDL.

4.5 Point Source Loads

For this TMDL, the WLAs for the point sources were set to zero because the surrogate being used for turbidity (TSS) is considered to represent inorganic suspended solids (i.e., soil and sediment particles from erosion or sediment resuspension). The suspended solids discharged by point sources in subsegment 110601 are assumed to consist primarily of organic solids rather than inorganic solids. Discharges of organic suspended solids from point sources are already addressed by LDEQ through their permitting of point sources to maintain water quality standards for DO. The WLAs to support this turbidity TMDL will not require any changes to the permits concerning organic suspended solids.

4.6 Nonpoint Source Loads

For the subsegment 110601 turbidity TMDL, the LA for nonpoint sources was set equal to the TMDL minus FG, because the WLA was zero and the MOS was implicit. Calculations for the TMDL are shown in Appendix D.

4.7 Percent Reductions

In addition to calculating the allowable load, an estimate was made for percent reduction of the nonpoint source load that would be needed for the observed data to meet LDEQ's water quality standards (LDEQ 2005b). The observed concentrations of TSS at the sampling station were reduced by certain percentages until none of the reduced concentrations were above the TSS target. The result of this percent reduction calculation is shown in Table 4.1.

Table 4.1. Turbidity TMDL for subsegment 110601.

Subsegment Number	Stream Name	Loads (tons/day of TSS)					Percent Reduction Needed
		WLA	LA	MOS	FG	TMDL	
110601	Vinton Waterway	0	32.35	implicit	3.60	35.95	65%

5.0 OTHER RELEVANT INFORMATION

This TMDL has been developed to be consistent with the State antidegradation policy (LAC 33:IX.1109.A).

LDEQ will work with other agencies such as local Soil Conservation Districts to implement nonpoint source best management practices in the watershed through the 319 programs. LDEQ will also continue to monitor the waters to determine whether standards are being attained.

In accordance with Section 106 of the Federal Clean Water Act, and under the authority of the Louisiana Environmental Quality Act, the LDEQ has established a comprehensive program for monitoring the quality of the State's surface waters. The LDEQ Surveillance Section collects surface water samples at various locations, utilizing appropriate sampling methods and procedures for ensuring the quality of the data collected. The objectives of the surface water monitoring program are to determine the quality of the State's surface waters, to develop a long-term database for water quality trend analysis, and to monitor the effectiveness of pollution controls. The data obtained through the surface water monitoring program is used to develop the State's biennial 305(b) report (Water Quality Inventory) and the 303(d) list of impaired waters. This information is also utilized in establishing priorities for the LDEQ nonpoint source program.

The LDEQ has implemented a watershed approach to surface water quality monitoring. Through this approach, the entire state is sampled over a 4-year cycle. Long-term trend monitoring sites at various locations on the larger rivers and Lake Pontchartrain are sampled throughout the 4-year cycle. Sampling is conducted on a monthly basis to yield approximately 12 samples per site each year the site is monitored. Sampling sites are located where they are considered to be representative of the waterbody. Under the current monitoring schedule, approximately one half of the State's waters are newly assessed for each 305(b) and 303(d) listing biennial cycle, with sampling occurring statewide each year. The 4-year cycle follows an initial 5-year rotation that covered all basins in the state according to the TMDL priorities. This will allow the LDEQ to determine whether there has been any improvement in water quality

following implementation of the TMDLs. As the monitoring results are evaluated at the end of each year, waterbodies may be added to or removed from the 303(d) list.

Hurricanes Katrina and Rita brought heavy winds and rain to southern Louisiana during August and September 2005. Both Hurricanes Katrina and Rita have caused a significant amount of change in sedimentation and water quality in south Louisiana. Many wastewater treatment facilities were temporarily or permanently damaged. Some wastewater treatment facilities will rebuild while others will relocate. The hurricanes expedited the loss of coastal land and modified the hydrology of some of the coastal waterbodies. Several federal and state agencies including the Environmental Protection Agency (EPA) and LDEQ are engaged in collecting environmental data and assessing the recovery of the Gulf of Mexico waters. This TMDL was developed based on the pre-hurricane conditions. Therefore, the post-hurricane conditions and other factors may require modifications to this TMDL prior to its implementation. Any deviation from this TMDL should be justified based on site-specific data and/or information.

6.0 PUBLIC PARTICIPATION

Federal regulations require EPA to notify the public and seek comment concerning TMDLs it prepares. The TMDL in this report was developed under contract to EPA, and EPA held a public review period seeking comments, information, and data from the public and any other interested parties. The notice for the public review period was published in the Federal Register on July 20, 2006, and the review period closed on August 21, 2006. Additional comments were accepted through October 20, 2006.

Comments were received from LDEQ, the Gulf Restoration Network, and six individuals. Comments and additional information submitted by October 20, 2006 were used to revise this TMDL report. The comments and responses to this TMDL are included in a separate document that includes comments on similar TMDLs with the same public review period.

EPA will submit the final version of this TMDL to LDEQ for implementation and incorporation into LDEQ's current water quality management plan.

7.0 REFERENCES

- LDEQ. 2005a. Louisiana 2004 Final Integrated Report, Appendix A. Online at [www.deq.Louisiana.gov/ portal/Portals/0/planning/305b/2004/04IR1-FINAL-Appendix A with FINAL U.S. EPA ADDITIONS-August 17, 2005.pdf](http://www.deq.Louisiana.gov/portal/Portals/0/planning/305b/2004/04IR1-FINAL-Appendix A with FINAL U.S. EPA ADDITIONS-August 17, 2005.pdf).
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APPENDIX A

Maps

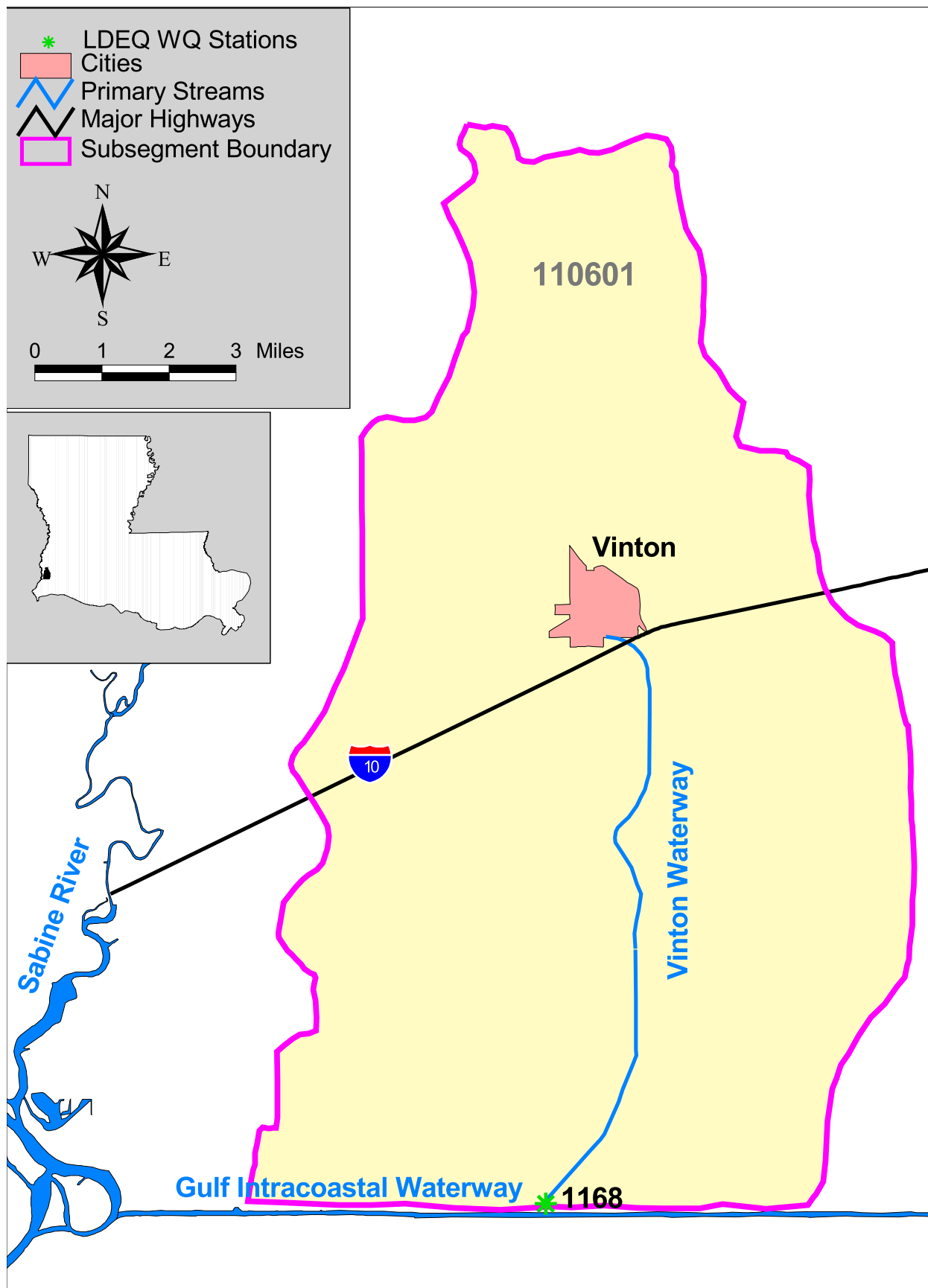


Figure A.1. Watershed map for subsegment 110601.

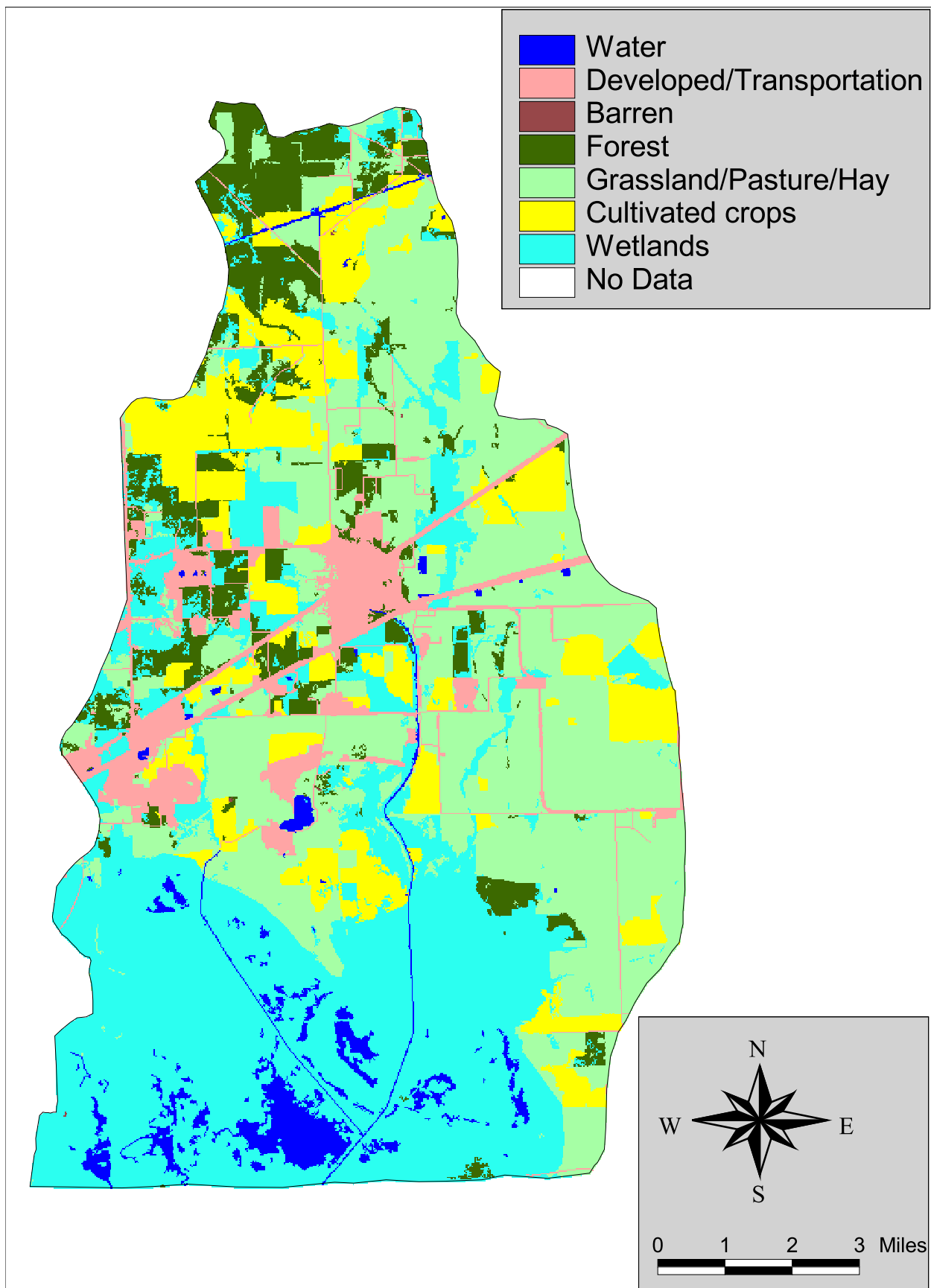


Figure A.2. Land use map for subsegment 110601.

APPENDIX B

Permitted Point Sources in Subsegment 110601

File Number	Facility Name	Location	Outfall	Sampled/Estimated/ Design Flows	Flow Units	Permitted Flow	Rec. Water	TSS Permit Limits	Included In TSS TMDL?
LA0066621	Vinton Land Application	Vinton, 1200 Horridge St; 900 Block of Williams Rd	001	Design 2.300	mgd	Report	Cooney Gully-Vinton Drainage Canal	NA	N
LA0096725	Vegas Magic	Vinton, 2334 Hwy 109 South	1 - Sanitary WW	3900	gpd	Report	Henry Gray Canal-Vinton WW	TSS = 30-45 mg/L (monthly - weekly avg.)	N
LAG480354	Tennessee Gas Pipeline Co Station 820 C-1	868 #7 Rd	102		gpd	5,000 gpd Permit Limit		NA	N
LAG480365	Tennessee Gas Pipeline Co Station 820 C-1	Vinton, 868 #7 Rd	001	98000	gpd	Report	Local drainage to Old River	NA	N
LAG480365	Tennessee Gas Pipeline Co Station 820 C-1	Vinton, 868 #7 Rd	002	65000	gpd	Report	Local drainage to Old River	NA	N
LAG530237	Hebert's Grocery Store	Vinton, 1220 Nelson St	001	1500	gpd	Report	Gum Gully-Gray Canal	NA	N
LAG540056	Autumn Acres Mobile Home Park	Vinton, 5925 LA Hwy 3112	001	9000	gpd	Report	Sabine River	NA	N
LAG540182	Delta Downs Motor Inn	Vinton, 2267 Old LA Hwy 90	001	14525	gpd	Report	Vinton Drainage Canal	NA	N
LAG540234	Bayou Club	Vinton, 2370 Hwy 109 S	001	5500	gpd	Report	Gum Gulley	NA	N
LAG540255	Texas Pelican Complex	Vinton, 2213 Old Hwy 90	001	20000	gpd	Report	Gray C-Vinton Drainage C-ICWW	NA	N
LAG540437	Toomey Rest Area & Tourist Center	Toomey, Route I-10	001	8585	gpd	Report	Tupelo Swamp - Sabine River	NA	N
LAG541046	Delta Down's Racetrack & Casino - 001	Vinton, 2717 Hwy 3063	001	240000	gpd	Report	Gray Canal	NA	N
LAG541046	Delta Down's Racetrack & Casino - 002		002		gpd	25,000	Gray Canal	NA	N
LAG541046	Delta Down's Racetrack & Casino - 003		003		gpd	25,000	Gum Gulley	NA	N
LAG541082	Bayou Gold Truck Stop	Vinton, 2372 Hwy 109 South	001	3800	gpd	Report	Local Drainage to Gum Gulley	NA	N
LAG541096	The Longhorn Enterprises	2374 Hwy 109 S	002	13,140	gpd	<25,000	Gum Gully	NA	N
LAG541097	Vegas Magic #2	2334 Hwy 109 S	002	8,240	gpd	<25,000	Henry Gray Canal-Vinton Waterway	NA	N
LAG750425	Vegas Magic #2		001	300	gpd	Report	Henry Gray Canal-Vinton Waterway	NA	N

APPENDIX C

Plots of Turbidity and TSS

Figure C.1 Turbidity for Vinton Waterway south of Vinton, LA (1168)

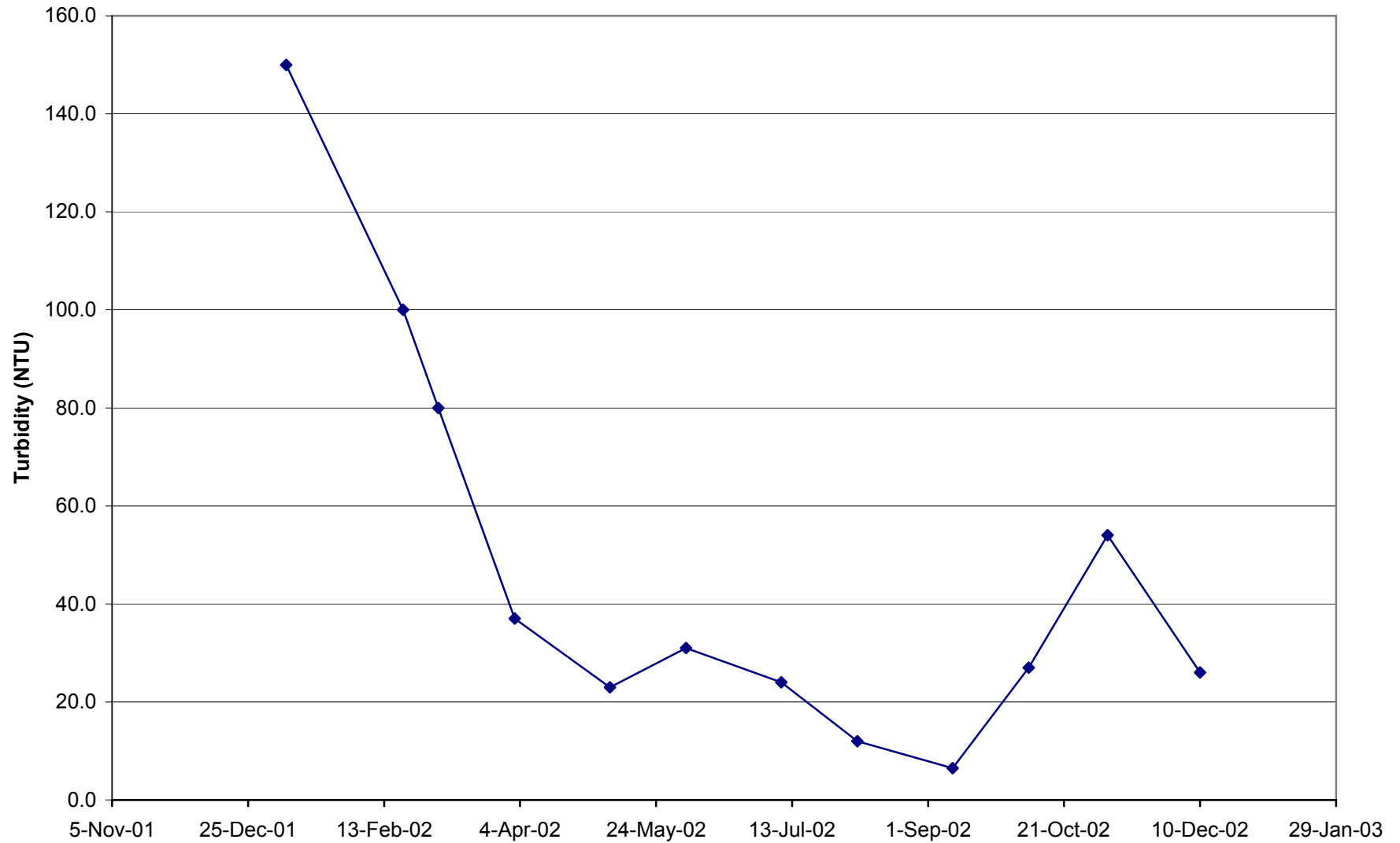


Figure C.2 TSS for Vinton Waterway south of Vinton, LA (1168)

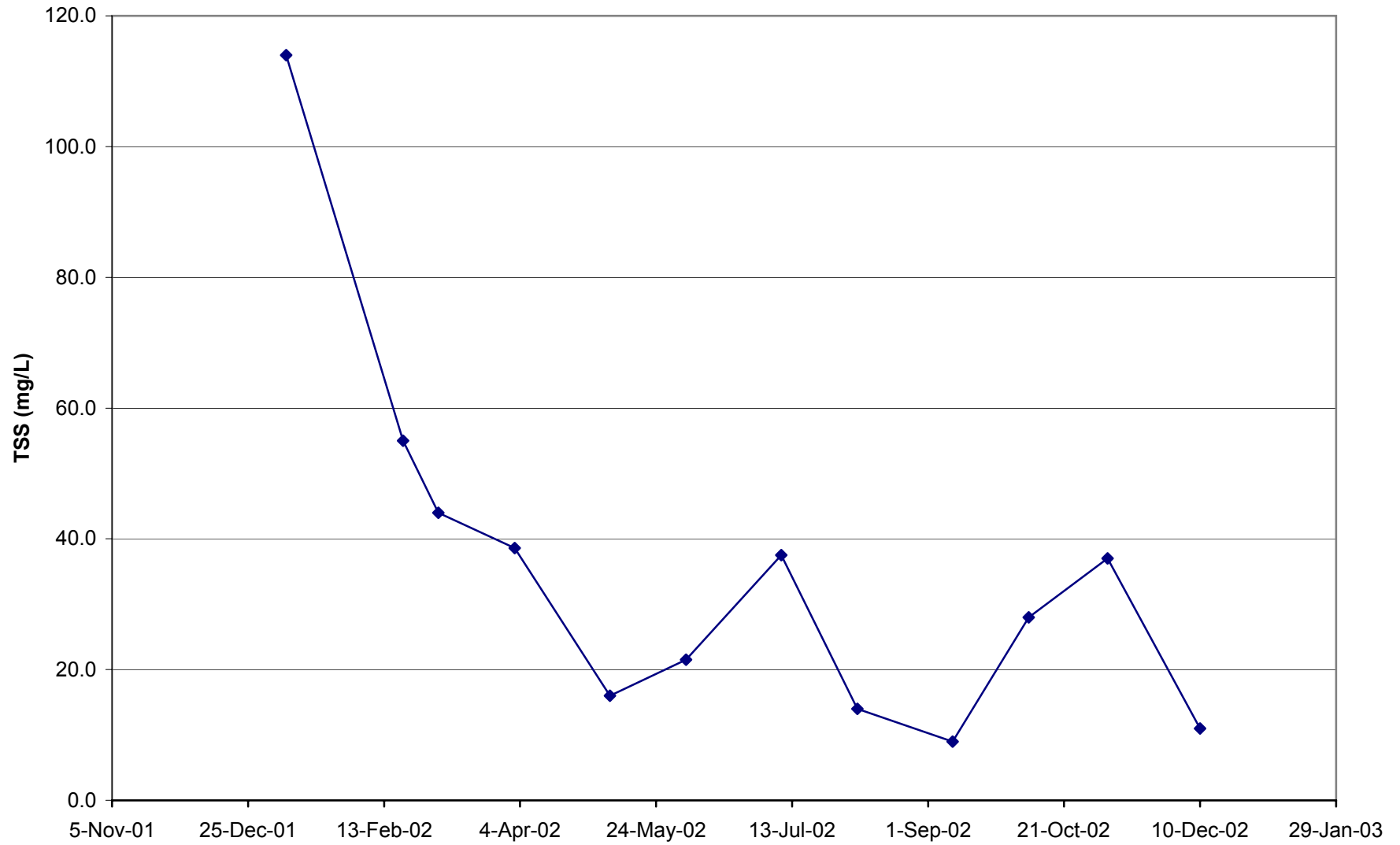
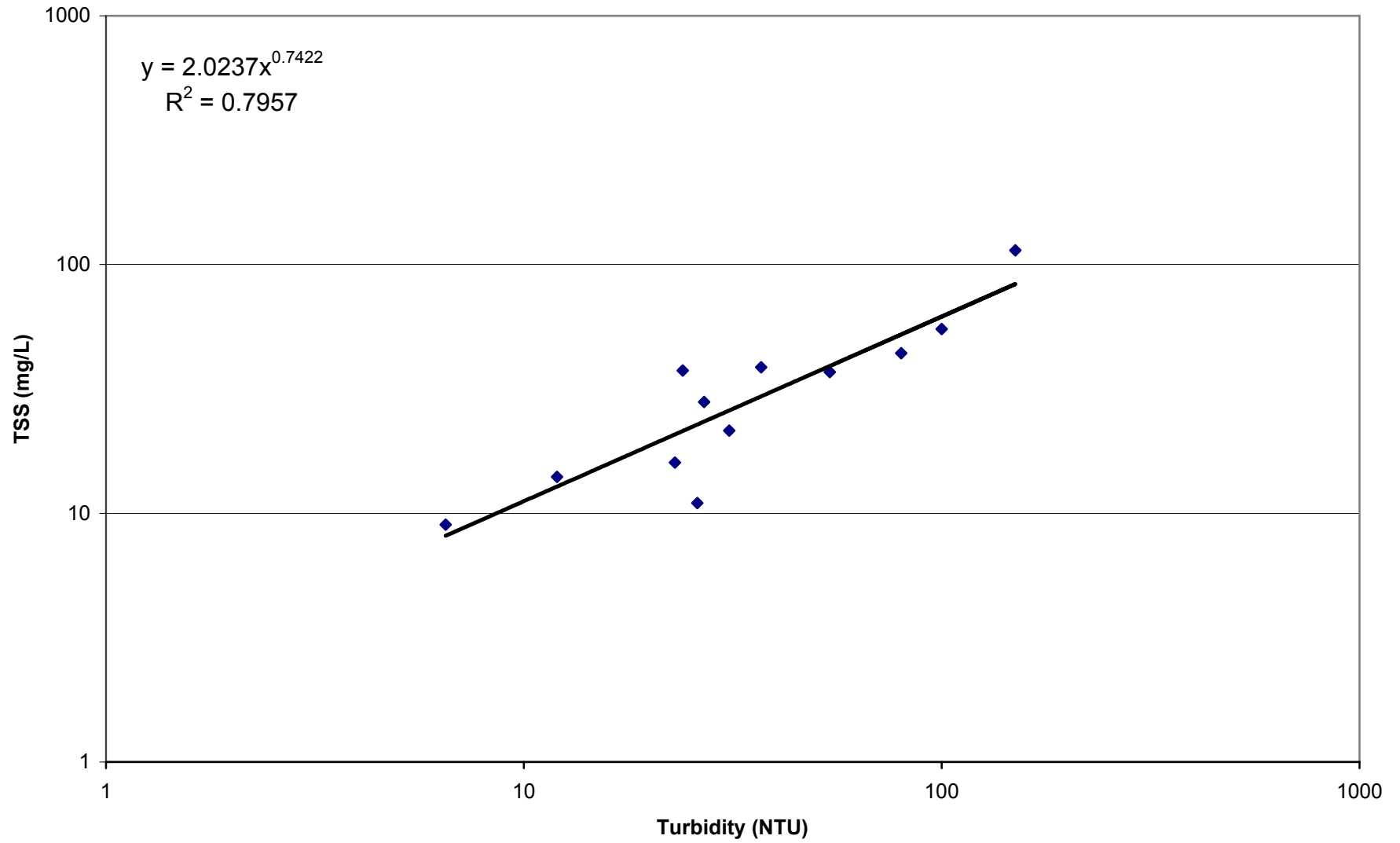


Figure C.3 Turbidity vs TSS for Vinton Waterway south of Vinton, LA (1168)



APPENDIX D

TMDL Calculations

Table D.1 Water Balances for LA07

average runoff (mm) from Jan 1980 - present = 70.707394 mm/month area of subsegment
 0.0707074 meters/month 3.46E+08
 0.231991 ft/month 3.72E+09

863956605 ft³/month
 333.31659 cfs
 9.4370931 cms

Note: There are 12 rows for each year, one for each month in calendar order. Therefore
 row 1 for 1980 is January, row 2 is February, etc. All values are in millimeters.

Date	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
1-1980	35.6	167.6	132.1	152.4	35.6	0	0	132.1	104.7
1-1980	31.5	52.8	21.3	152.4	31.5	0	0	21.3	62
1-1980	41	227.3	185.3	152.4	41	0	0	185.3	124.2
1-1980	52.7	118.6	65.9	152.4	52.7	0	0	65.9	95
1-1980	72.8	323.3	250.5	152.4	72.8	0	0	250.5	172.8
1-1980	92.1	45	-46.1	106.3	92.1	0	0	0	86.4
1-1980	101	126.5	25.4	131.8	101	0	0	0	43.2
1-1980	96.3	47.8	-48.5	89.8	89.7	6.6	0	0	21.6
1-1980	92.1	109.7	17.7	107.5	92.1	0	0	0	10.8
1-1980	51.4	109.7	58.3	152.4	51.4	0	0	13.3	12.1
1-1980	38.8	113.5	74.8	152.4	38.8	0	0	74.8	43.4
1-1980	32.5	55.6	23.1	152.4	32.5	0	0	23.1	33.3
1-1981	28.2	54.4	26.2	152.4	28.2	0	0	26.2	29.7
1-1981	33.1	84.8	51.7	152.4	33.1	0	0	51.7	40.7
1-1981	42.7	56.9	14.2	152.4	42.7	0	0	14.2	27.5
1-1981	65.7	31.2	-34.5	117.9	65.7	0	0	0	13.7
1-1981	67.1	104.1	37.1	152.4	67.1	0	0	2.6	8.2
1-1981	90.8	288.8	197	152.4	90.8	0	0	197	103.1
1-1981	95.6	176.5	80.9	152.4	95.6	0	0	80.9	91
1-1981	92.7	98.3	5.6	152.4	92.7	0	0	5.6	48.8
1-1981	75.4	90.9	15.5	152.4	75.4	0	0	15.5	32.2
1-1981	58.6	118.9	60.2	152.4	58.6	0	0	60.2	46.2
1-1981	47.4	81.3	33.9	152.4	47.4	0	0	33.9	40.1
1-1981	32.6	109.5	76.8	152.4	32.6	0	0	76.8	58.4
1-1982	32.4	64.3	31.8	152.4	32.4	0	0	31.8	45.1
1-1982	32.3	111.8	79.4	152.4	32.3	0	0	79.4	62.3
1-1982	47.5	69.1	21.6	152.4	47.5	0	0	21.6	41.9
1-1982	54.2	143	88.8	152.4	54.2	0	0	88.8	65.4
1-1982	71.6	136.1	64.5	152.4	71.6	0	0	64.5	64
1-1982	88.3	153.7	65.3	152.4	88.3	0	0	65.3	65.1
1-1982	93.7	116.8	23.2	152.4	93.7	0	0	23.2	44.2
1-1982	93.3	135.1	41.8	152.4	93.3	0	0	41.8	42
1-1982	75.7	146.3	70.6	152.4	75.7	0	0	70.6	56.8
1-1982	56.6	70.9	14.2	152.4	56.6	0	0	14.2	35.5

Date	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
1-1982	44	172	127	152.4	44	0	0	127	81.8
1-1982	39.3	354.8	315.5	152.4	39.3	0	0	315.5	198.6
1-1983	29.5	145.8	116.3	152.4	29.5	0	0	116.3	157.4
1-1983	33.7	154.7	121	152.4	33.7	0	0	121	139.2
1-1983	39.3	94	55.7	152.4	39.3	0	0	55.7	97.5
1-1983	47.5	64.5	16	152.4	47.5	0	0	16	57.2
1-1983	66.8	241	174.2	152.4	66.8	0	0	174.2	115.7
1-1983	79.4	150.4	70	152.4	79.4	0	0	70	93.3
1-1983	93.7	77.2	-16.5	135.9	93.7	0	0	0	46.7
1-1983	93.7	207.5	113.8	152.4	93.7	0	0	97.4	72
1-1983	74.4	188.5	114.1	152.4	74.4	0	0	114.1	93.1
1-1983	58.6	26.2	-32.5	119.9	58.6	0	0	0	46.5
1-1983	44.7	108	64.3	152.4	44.7	0	0	31.8	39.2
1-1983	27.8	149.4	121.6	152.4	27.8	0	0	121.6	80.4
1-1984	26.9	128.5	101.6	152.4	26.9	0	0	101.6	90
1-1984	35.5	159	123.5	152.4	35.5	0	0	123.5	107.3
1-1984	44.5	51.8	7.3	152.4	44.5	0	0	7.3	57.3
1-1984	56.1	46.7	-9.3	143.1	56.1	0	0	0	28.6
1-1984	70.4	210.1	139.7	152.4	70.4	0	0	130.3	79.5
1-1984	83.9	90.7	6.8	152.4	83.9	0	0	6.8	43.1
1-1984	88	142.2	53.3	152.4	88	0	0	53.3	48.2
1-1984	90.2	105.4	15.2	152.4	90.2	0	0	15.2	31.7
1-1984	75.1	141.5	66.3	152.4	75.1	0	0	66.3	49
1-1984	67.5	331.7	264.2	152.4	67.5	0	0	264.2	156.6
1-1984	41.5	120.7	79.1	152.4	41.5	0	0	79.1	117.9
1-1984	46.4	69.3	22	152.4	46.4	0	0	22	70.4
1-1985	26.1	117.9	91.8	152.4	26.1	0	0	91.8	81.1
1-1985	30.5	167.6	137.2	152.4	30.5	0	0	137.2	109.1
1-1985	51.6	110	59.4	152.4	51.6	0	0	59.4	84.3
1-1985	60.9	46	-13.9	138.5	60.9	0	0	0	42.1
1-1985	72.6	83.6	10	149.5	72.6	0	0	0	21.1
1-1985	88	86.4	-2.6	146.9	88.9	0	0	0	10.5
1-1985	90.2	147.8	57.6	152.4	90.2	0	0	52.2	31.3
1-1985	93.7	189.2	95.6	152.4	93.7	0	0	95.6	63.5
1-1985	79.1	125.5	46.4	152.4	79.1	0	0	46.4	54.9
1-1985	63.3	379.5	316.2	152.4	63.3	0	0	316.2	185.6
1-1985	52.9	77	25.1	152.4	52.9	0	0	25.1	105.3
1-1985	29.9	117.3	87.5	152.4	29.9	0	0	87.5	96.4
1-1986	31.4	61	30.5	152.4	31.4	0	0	30.5	63.5
1-1986	40.4	49.8	9.4	152.4	40.4	0	0	9.4	36.4
1-1986	43.2	67.3	24.2	152.4	43.2	0	0	24.2	30.3
1-1986	57.2	62	5.8	152.4	57.2	0	0	5.8	18
1-1986	72.6	127.5	54.9	152.4	72.6	0	0	54.9	36.5
1-1986	89.6	169.9	80.4	152.4	89.6	0	0	80.4	58.4
1-1986	95	101.9	5.9	152.4	95	0	0	5.9	32.2
1-1986	90.8	85.3	-5.5	146.9	90.8	0	0	0	16.1
1-1986	88.3	124.5	36.1	152.4	88.3	0	0	30.7	23.4
1-1986	57.8	139	82.1	152.4	57.8	0	0	82.1	52.7
1-1986	47.4	202.4	155.1	152.4	47.4	0	0	155.1	103.9

Date	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
1-1986	31.8	177.8	146	152.4	31.8	0	0	146	124
1-1987	29	178.6	149.5	152.4	29	0	0	149.5	137.2
1-1987	37.1	164.1	126	152.4	37.1	0	0	126	132.1
1-1987	41.7	90.2	48.5	152.4	41.7	0	0	48.5	90.3
1-1987	51.8	8.6	-43.2	109.2	51.8	0	0	0	45.2
1-1987	75.7	158.2	82.6	152.4	75.7	0	0	39.4	42.3
1-1987	85.4	239.3	153.9	152.4	85.4	0	0	153.9	98.1
1-1987	92.1	185.9	93.9	152.4	92.1	0	0	93.9	95
1-1987	98.3	126.2	27.9	152.4	98.3	0	0	27.9	61
1-1987	77.5	100.6	23.1	152.4	77.5	0	0	23.1	42.5
1-1987	50.6	57.9	7.3	152.4	50.6	0	0	7.3	24.9
1-1987	43.3	193.8	150.5	152.4	43.3	0	0	150.5	87.7
1-1987	37.6	121.4	83.8	152.4	37.6	0	0	83.8	85.8
1-1988	27	76.2	49.2	152.4	27	0	0	49.2	67.5
1-1988	33.3	176.8	143.5	152.4	33.3	0	0	143.5	105.5
1-1988	42.9	176.5	133.7	152.4	42.9	0	0	133.7	119.6
1-1988	56.1	93.7	37.7	152.4	56.1	0	0	37.7	78.6
1-1988	67.3	36.6	-30.7	121.7	67.3	0	0	0	39.3
1-1988	82.2	108	26.8	148.5	82.2	0	0	0	19.7
1-1988	90.5	177	86.5	152.4	90.5	0	0	82.6	51.1
1-1988	92.4	179.6	87.2	152.4	92.4	0	0	87.2	69.2
1-1988	80.2	139.4	59.2	152.4	80.2	0	0	59.2	64.2
1-1988	55.5	87.6	32.1	152.4	55.5	0	0	32.1	48.2
1-1988	48.2	54.4	6.2	152.4	48.2	0	0	6.2	27.2
1-1988	34.7	157.7	122	152.4	34.7	0	0	122	75.1
1-1989	38.8	141.2	102.4	152.4	38.8	0	0	102.4	88.8
1-1989	32.8	33.3	0.5	152.4	32.8	0	0	0.5	44.6
1-1989	43.2	146.3	103.2	152.4	43.2	0	0	103.2	73.9
1-1989	54.2	53.6	-0.6	151.8	54.2	0	0	0	36.9
1-1989	74.6	216.4	141.8	152.4	74.6	0	0	141.2	89.1
1-1989	82.5	469.6	387.2	152.4	82.5	0	0	387.2	238.1
1-1989	88	204	116.9	152.4	88	0	0	116.9	177.5
1-1989	88.6	96	7.4	152.4	88.6	0	0	7.4	92.5
1-1989	75.9	44	-30	121.4	75.9	0	0	0	46.2
1-1989	58	35.1	-22	103.1	53.4	4.7	0	0	23.1
1-1989	45.8	110.7	64	152.4	45.8	0	0	15.7	19.4
1-1989	24.6	122.9	98.3	152.4	24.6	0	0	98.3	58.9
1-1990	36	243.3	206.4	152.4	36	0	0	206.4	132.6
1-1990	42.3	156	114.7	152.4	42.3	0	0	114.7	123.7
1-1990	46.9	152.9	106	152.4	46.9	0	0	106	114.8
1-1990	55.1	87.1	32	152.4	55.1	0	0	32	73.4
1-1990	72.8	122.7	49.8	152.4	72.8	0	0	49.8	61.6
1-1990	94.3	66.3	-28	124.4	94.3	0	0	0	30.8
1-1990	90.5	100.6	10.1	134.5	90.5	0	0	0	15.4
1-1990	93	51.6	-42.4	97	88	4	0	0	7.7
1-1990	83.9	149.4	65.5	152.4	83.9	0	0	10.1	8.9
1-1990	55.3	59.9	4.6	152.4	55.3	0	0	4.6	6.8
1-1990	47.2	91.7	44.5	152.4	47.2	0	0	44.5	25.6
1-1990	36.6	126.7	90.2	152.4	36.6	0	0	90.2	57.9

Date	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
1-1991	30.2	339.1	308.9	152.4	30.2	0	0	308.9	183.4
1-1991	38.3	128	89.8	152.4	38.3	0	0	89.8	136.6
1-1991	46.7	84.6	37.9	152.4	46.7	0	0	37.9	87.2
1-1991	62.8	197.9	135	152.4	62.8	0	0	135	111.1
1-1991	76.2	345.4	269.3	152.4	76.2	0	0	269.3	190.2
1-1991	87.7	191.5	103.8	152.4	87.7	0	0	103.8	146
1-1991	93	171.4	78.4	152.4	93	0	0	78.4	112.7
1-1991	89.3	166.1	76.9	152.4	89.3	0	0	76.9	94.8
1-1991	76.2	106.4	30.2	152.4	76.2	0	0	30.2	62.5
1-1991	62.8	130.6	67.7	152.4	62.8	0	0	67.7	65.1
1-1991	36.7	82.5	45.8	152.4	36.7	0	0	45.8	55.5
1-1991	37	128	90	152.4	37	0	0	90	72.8
1-1992	30.8	270.3	239.5	152.4	30.8	0	0	239.5	156.1
1-1992	40.3	146.6	106.3	152.4	40.3	0	0	106.3	131.2
1-1992	46.7	136.4	89.7	152.4	46.7	0	0	89.7	110.4
1-1992	54.9	142.2	87.3	152.4	54.9	0	0	87.3	98.9
1-1992	67	83.8	15.8	152.4	67	0	0	15.8	57.4
1-1992	86.8	194.1	107.2	152.4	86.8	0	0	107.2	82.3
1-1992	92.7	142.7	50	152.4	92.7	0	0	50	66.2
1-1992	83	121.9	38.9	152.4	83	0	0	38.9	52.5
1-1992	79.1	116.6	37.5	152.4	79.1	0	0	37.5	44
1-1992	58	57.9	-0.1	152.3	58	0	0	0	22.5
1-1992	37.6	202.2	164.6	152.4	37.6	0	0	164.5	93.5
1-1992	36.5	111.3	74.8	152.4	36.5	0	0	74.8	84.1
1-1993	33.8	229.6	195.8	152.4	33.8	0	0	195.8	139
1-1993	35.5	89.2	53.7	152.4	35.5	0	0	53.7	96.8
1-1993	40.8	150.6	109.8	152.4	40.8	0	0	109.8	103.3
1-1993	49	231.9	182.9	152.4	49	0	0	182.9	143.1
1-1993	66.1	143.8	77.6	152.4	66.1	0	0	77.6	110.4
1-1993	86.2	235.5	149.2	152.4	86.2	0	0	149.2	129.8
1-1993	94.3	74.2	-20.1	132.3	94.3	0	0	0	64.9
1-1993	97	101.3	3.4	135.6	97	0	0	0	32.4
1-1993	83.3	56.6	-26.7	111.9	80.4	2.9	0	0	16.2
1-1993	57.2	151.4	94.1	152.4	57.2	0	0	53.6	34.9
1-1993	39.6	182.1	142.5	152.4	39.6	0	0	142.5	88.7
1-1993	33.8	106.9	73.1	152.4	33.8	0	0	73.1	80.9
1-1994	30.3	118.1	87.8	152.4	30.3	0	0	87.8	84.4
1-1994	36.3	71.6	35.3	152.4	36.3	0	0	35.3	59.8
1-1994	44.5	71.9	27.4	152.4	44.5	0	0	27.4	43.6
1-1994	57.6	127	69.4	152.4	57.6	0	0	69.4	56.5
1-1994	69.7	150.9	81.2	152.4	69.7	0	0	81.2	68.9
1-1994	88	153.2	65.1	152.4	88	0	0	65.1	66
1-1994	89.6	184.2	94.6	152.4	89.6	0	0	94.6	80.8
1-1994	87.1	100.1	12.9	152.4	87.1	0	0	12.9	46.9
1-1994	75.1	107.7	32.6	152.4	75.1	0	0	32.6	39.7
1-1994	59.2	129	69.8	152.4	59.2	0	0	69.8	54.7
1-1994	50.4	49.5	-0.9	151.5	50.4	0	0	0	27.4
1-1994	36	135.1	98.2	152.4	36	0	0	97.3	62.3
1-1995	33.7	173.5	139.8	152.4	33.7	0	0	139.8	101.1

Date	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
1-1995	37.7	69.8	32.1	152.4	37.7	0	0	32.1	66.6
1-1995	46.7	230.6	183.9	152.4	46.7	0	0	183.9	125.3
1-1995	56.8	179.6	122.7	152.4	56.8	0	0	122.7	123
1-1995	75.9	162.1	86.1	152.4	75.9	0	0	86.1	105.1
1-1995	85.9	76.5	-9.5	142.9	85.9	0	0	0	52.5
1-1995	94.6	212.6	117	152.4	94.6	0	0	108.5	80.5
1-1995	98.3	149.1	50.8	152.4	98.3	0	0	50.8	65.7
1-1995	83.3	72.1	-11.2	141.2	83.3	0	0	0	32.8
1-1995	58.2	92.2	33	152.4	58.2	0	0	22.8	27.8
1-1995	41.7	175.8	134.1	152.4	41.7	0	0	134.1	80.9
1-1995	34	197.4	163.3	152.4	34	0	0	163.3	122.1
1-1996	31.8	88.1	56.4	152.4	31.8	0	0	56.4	89.3
1-1996	35.3	38.4	3	152.4	35.3	0	0	3	46.1
1-1996	37.3	40.1	2.8	152.4	37.3	0	0	2.8	24.5
1-1996	53.1	81.8	28.7	152.4	53.1	0	0	28.7	26.6
1-1996	79.1	35.1	-44.1	108.3	79.1	0	0	0	13.3
1-1996	85.9	153.7	67.7	152.4	85.9	0	0	23.7	18.5
1-1996	94.6	129.3	34.6	152.4	94.6	0	0	34.6	26.6
1-1996	88	218.7	129.7	152.4	88	0	0	129.7	78.2
1-1996	78	196.1	118	152.4	78	0	0	118	98.1
1-1996	58.2	222.3	164	152.4	58.2	0	0	164	131.1
1-1996	45.6	113.8	68.2	152.4	45.6	0	0	68.2	99.6
1-1996	37.9	99.8	61	152.4	37.9	0	0	61	80.8
1-1997	31.4	143	111.6	152.4	31.4	0	0	111.6	96.2
1-1997	36.7	230.6	193.9	152.4	36.7	0	0	193.9	145.1
1-1997	52.5	110.7	58.2	152.4	52.5	0	0	58.2	101.6
1-1997	49	207	157	152.4	49	0	0	157	129.8
1-1997	70.6	160.5	89.9	152.4	70.6	0	0	89.9	109.9
1-1997	85.9	123.7	37.8	152.4	85.9	0	0	37.8	73.8
1-1997	96	121.4	24.5	152.4	96	0	0	24.5	49.1
1-1997	93.3	105.9	12.6	152.4	93.3	0	0	12.6	30.9
1-1997	84.2	109.7	25.5	152.4	84.2	0	0	25.5	28.2
1-1997	57.8	88.4	30.6	152.4	57.8	0	0	30.6	29.4
1-1997	39.2	123.4	84.3	152.4	39.2	0	0	84.3	56.8
1-1997	31.8	151.9	120.1	152.4	31.8	0	0	120.1	88.5
1-1998	37.3	313.2	275.8	152.4	37.3	0	0	275.8	182.2
1-1998	36.8	137.2	100.3	152.4	36.8	0	0	100.3	141.2
1-1998	42.9	96	53.2	152.4	42.9	0	0	53.2	97.2
1-1998	52.7	101.9	49.2	152.4	52.7	0	0	49.2	73.2
1-1998	79.4	1.3	-78.1	74.3	79.4	0	0	0	36.6
1-1998	96.3	125.7	29.4	103.7	96.3	0	0	0	18.3
1-1998	101.7	83.3	-18.4	91.2	95.9	5.9	0	0	9.1
1-1998	100	144	44	135.2	100	0	0	0	4.6
1-1998	91.1	339.1	247	152.4	91.1	0	0	230.8	117.7
1-1998	65.2	104.6	39.4	152.4	65.2	0	0	39.4	78.5
1-1998	50	117.3	67.3	152.4	50	0	0	67.3	72.9
1-1998	36	114.3	77.3	152.4	36	0	0	77.3	75.1
1-1999	38.1	116.6	78.5	152.4	38.1	0	0	78.5	76.8
1-1999	42.9	43.2	0.3	152.4	42.9	0	0	0.3	38.6

Date	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
1-1999	45.1	112	66.9	152.4	45.1	0	0	66.9	52.7
1-1999	65.2	46.2	-19	133.4	65.2	0	0	0	26.4
1-1999	72.1	129	56.9	152.4	72.1	0	0	37.9	32.1
1-1999	87.7	207.5	119.8	152.4	87.7	0	0	119.8	75
1-1999	92.7	152.4	59.7	152.4	92.7	0	0	59.7	67.8
1-1999	103.5	30.7	-72.8	79.6	103.5	0	0	0	33.9
1-1999	78	103.1	25.1	104.7	78	0	0	0	16
1-1999	57.4	50.5	-6.9	99	55.3	2.2	0	0	8.5
1-1999	45.3	25.9	-19.4	87.3	38.6	6.7	0	0	4.2
1-1999	33.2	117.1	83.9	152.4	33.2	0	0	18.7	11.5
1-2000	35	32.5	-3.4	148	35	0	0	0	5.7
1-2000	43.2	18.8	-24.4	125.2	42.6	0.5	0	0	2.9
1-2000	51.8	75.9	24.1	149.3	51.8	0	0	0	1.4
1-2000	54.2	98.6	44.4	152.4	54.2	0	0	41.3	21.4
1-2000	78.6	165.9	87.3	152.4	78.6	0	0	87.3	54.3
1-2000	88.3	140.2	51.9	152.4	88.3	0	0	51.9	53.1
1-2000	95.6	85.3	-10.3	142.1	95.6	0	0	0	26.5
1-2000	97.3	59.2	-38.1	106.6	94.7	2.6	0	0	13.3
1-2000	81.9	83.8	1.9	108.5	81.9	0	0	0	6.6
1-2000	58.6	48.8	-9.9	101.5	55.8	2.8	0	0	3.3
1-2000	39.9	323.1	283.2	152.4	39.9	0	0	232.3	117.8
1-2000	26.9	69.3	42.4	152.4	26.9	0	0	42.4	80.1
1-2001	28.3	149.9	121.5	152.4	28.3	0	0	121.5	100.8
1-2001	41.4	34.3	-7.1	145.3	41.4	0	0	0	50.4
1-2001	39.6	232.9	193.3	152.4	39.6	0	0	186.2	118.3
1-2001	64.3	52.1	-12.3	140.1	64.3	0	0	0	59.2
1-2001	73.9	30.7	-43.1	100.5	70.4	3.5	0	0	29.6
1-2001	83.3	313.7	230.4	152.4	83.3	0	0	178.4	104
1-2001	94.3	124.7	30.4	152.4	94.3	0	0	30.4	67.2
1-2001	91.4	202.9	111.5	152.4	91.4	0	0	111.5	89.4
1-2001	75.9	253.5	177.6	152.4	75.9	0	0	177.6	133.5
1-2001	53.1	146.3	93.2	152.4	53.1	0	0	93.2	113.4
1-2001	49.5	157	108.5	152.4	49.5	0	0	108.5	110.9
1-2001	38.1	113	74.9	152.4	38.1	0	0	74.9	92.9
1-2002	34.6	79.2	44.6	152.4	34.6	0	0	44.6	68.8
1-2002	31.8	54.4	22.6	152.4	31.8	0	0	22.6	45.7
1-2002	43.5	116.6	73.1	152.4	43.5	0	0	73.1	59.4
1-2002	63.9	100.8	36.9	152.4	63.9	0	0	36.9	48.2
1-2002	72.1	57.4	-14.7	137.7	72.1	0	0	0	24.1
1-2002	85.4	193.3	107.9	152.4	85.4	0	0	93.3	58.7
1-2002	93.3	184.2	90.8	152.4	93.3	0	0	90.8	74.7
1-2002	93	208.3	115.3	152.4	93	0	0	115.3	94
1-2002	81.6	150.1	68.5	152.4	81.6	0	0	68.5	81.7
1-2002	62.4	434.8	372.5	152.4	62.4	0	0	372.5	227.1
1-2002	40.7	160.3	119.6	152.4	40.7	0	0	119.6	173.3
1-2002	34	222.5	188.5	152.4	34	0	0	188.5	180.9
1-2003	28.5	37.8	9.3	152.4	28.5	0	0	9.3	95.1
1-2003	34.9	145.8	110.9	152.4	34.9	0	0	110.9	103
1-2003	44.1	86.4	42.3	152.4	44.1	0	0	42.3	72.7

Date	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
1-2003	55.9	67.1	11.2	152.4	55.9	0	0	11.2	41.9
1-2003	83.3	23.1	-60.2	92.2	83.3	0	0	0	20
1-2003	82.2	256.3	174.1	152.4	82.2	0	0	113.9	67.4
1-2003	92.7	150.6	57.9	152.4	92.7	0	0	57.9	62.7
1-2003	94.6	163.8	69.2	152.4	94.6	0	0	69.2	65.9

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TABLE D.2 PERCENT REDUCTION FOR LDEQ STN 1168 (SUBSEGMENT 110601)

TSS target =	40 mg/L	Error check for reduction is / is not needed:	ok
Percent Reduction =	65%	Error check for less or more reduction needed:	ok

Collection Date	observed TSS at Stn 1168 (mg/L)	reduced TSS (mg/L)	is reduced TSS less than Std
8-Jan-02	114.0	39.9	yes
20-Feb-02	55.0	19.3	yes
5-Mar-02	44.0	15.4	yes
2-Apr-02	38.6	13.5	yes
7-May-02	16.0	5.6	yes
4-Jun-02	21.5	7.5	yes
9-Jul-02	37.5	13.1	yes
6-Aug-02	14.0	4.9	yes
10-Sep-02	9.0	3.2	yes
8-Oct-02	28.0	9.8	yes
6-Nov-02	37.0	13.0	yes
10-Dec-02	11.0	3.9	yes

Total number of values =	12
Allowable % of exceedances =	0%
Allowable no. of exceedances =	0
No. of exceedances before reductions =	3
No. of exceedances after reductions =	0

Total allowable loading =	35.95 tons/day
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Explicit MOS for TSS for Subsegment 100602 (implicit) =	0 tons/day
Future growth for TSS for Subsegment 100602 (10% of TMDL) =	3.595 tons/day

Sum of design flows for point sources of TSS for Subsegment 110601 =	0.000 cms
Assumed effluent TSS concentration for point sources =	0 mg/L
Existing point source TSS load for Subsegment 110601 =	0.00 tons/day

WLA for TSS for Subsegment 110601 (same as existing Point Source load) = 0.00 tons/day

LA for TSS for Subsegment 110601 = total - MOS - WLA - FG= 32.36 tons/day

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